

**Two new abyssal species of *Phalodrilus*
(Oligochaeta, Tubificidae)
from the South Indian Ocean**

by Christer ERSÉUS

Abstract. — *Phalodrilus segonzaci* sp. nov. and *P. stilus* sp. nov. are described from the basin of Mozambique. The species appear closely related to abyssal species in the North Atlantic.

Résumé. — Deux nouvelles espèces abyssales du genre *Phalodrilus*, récoltées lors d'une campagne océanographique (SAFARI I) dans le bassin du Mozambique (océan Indien), sont décrites : *Phalodrilus segonzaci* sp. nov. et *P. stilus* sp. nov. Ces espèces sont voisines d'espèces abyssales de l'Atlantique nord.

C. ERSÉUS, Department of Zoology, University of Göteborg, Box 25059, S-400 31 Göteborg, Sweden (postal address); and Swedish Museum of Natural History, Stockholm, Sweden.

INTRODUCTION

During the deep-sea cruise 'SAFARI I', in the Mozambique Basin, South Indian Ocean, initiated by the Terres Australes et Antarctiques Françaises (TAAF), a few tubificid oligochaetes were collected at one abyssal station (Stn. Si 05). These worms were placed at the author's disposal by the Centre National de Tri d'Océanographie Biologique (CENTOB), Brest, France. The material represents two new species of the genus *Phalodrilus* Pierantoni, and they are described in the present paper.

The genital region of one specimen was sectioned and stained with Heidenhain's haematoxylin and eosin. The anterior end of the same worm, as well as three other individuals, were stained in paracarmine and mounted whole in Canada balsam. The type specimens are deposited in the Muséum national d'Histoire naturelle (MNHN), Paris.

Abbreviations in the figures

a, atrium ; ass, anterior spermathecal seta ; cp, clitellar pad ; fp, flap-like protuberance ; gt, glandular tissue ; mf, male funnel ; prl, prostatic lobe ; pr 1 anterior prostate gland ; pr 2, posterior prostate gland ; ps, penial seta ; pss, posterior spermathecal seta ; s, spermatheca ; sg, setal gland ; vd, vas deferens.

SYSTEMATIC DESCRIPTIONS

Genus **PHALLODRILUS** Pierantoni, 1902

Phalldrillus segonzaci sp. nov.

(Fig. 1)

HOLOTYPE : MNHN n° UB 551, whole-mounted specimen from E of South Africa, Indian Ocean, 30°22.3' S, 40°01.1' E, 4,910 m (24 Aug. 1979).

PARATYPE : MNHN n° UB 552, one whole-mounted, sexually immature specimen (posterior end missing) from type locality.

ETYMOLOGY : Named for Dr. M. SEGONZAC (CENTOB), who provided the material from 'SAFARI I', and who kindly has placed several collections of oligochaetes at my disposal over the years.

DESCRIPTION OF HOLOTYPE

Length more than 16.1 mm, more than 47 segments (specimen not complete). Width at XI (compressed specimen) 0.36 mm. Prostomium large. Clitellum well developed, extending over 1/2X-1/2XII, thickened mid-ventrally to form three distinct pads, located posteriorly in IX, X and XI, respectively. Somatic setae slender, generally 95-140 μ m long, about 3.5 μ m thick (markedly smaller in II), (2)3-4 per bundle anteriorly, (2)3 per bundle in postclitellar segments, anteriorly with upper tooth shorter and much thinner than lower (fig. 1A), in postclitellar segments with upper tooth very much reduced (fig. 1B); some posterior setae appear single-pointed but upper tooth may be hidden by lower in these. Ventral setae of IX, X and XI modified into single-pointed genital setae : those of IX (fig. 1C, ass) 1-2 per bundle, somewhat sigmoid, about 180 μ m long, about 7 μ m thick ; those of X (pss) 2 per bundle, sigmoid (one shown in fig. 1C broken), about 210 μ m long, about 7 μ m thick ; those of XI (ps) stouter, probably also somewhat sigmoid, 2 per bundle, about 190 μ m long, about 12 μ m thick, with inner ends tilted over to anterior. Compact glandular bodies (fig. 1C, sg) enclosing part of each genital setae, at least those of IX-X. Male and spermathecal pores paired in line with ventral setae, in middle of XI and anteriorly in X, respectively.

Pharyngeal glands extending into VI. Male genitalia (fig. 1C) paired. Vas deferens about 14 μ m wide, not observed in its full length. Atrium small, comma-shaped, about 100 μ m long, about 28 μ m wide, entally with granulated inner epithelium (ciliation not seen) and thin outer lining ; atrium opening to exterior through simple pore. Prostate glands, one anterior and one posterior, discrete, but attachments to atrium not seen. Glandular tissue associated with body wall immediately posterior to atrium ; similar, but poorly developed glands are also present posterior to anterior spermathecal setae in IX. Spermathecae (fig. 1C, s) slender, with 25 μ m long, 12 μ m wide ducts, and thin-walled, 90 μ m long, 25 μ m wide ampullae ; latter with scattered sperm.

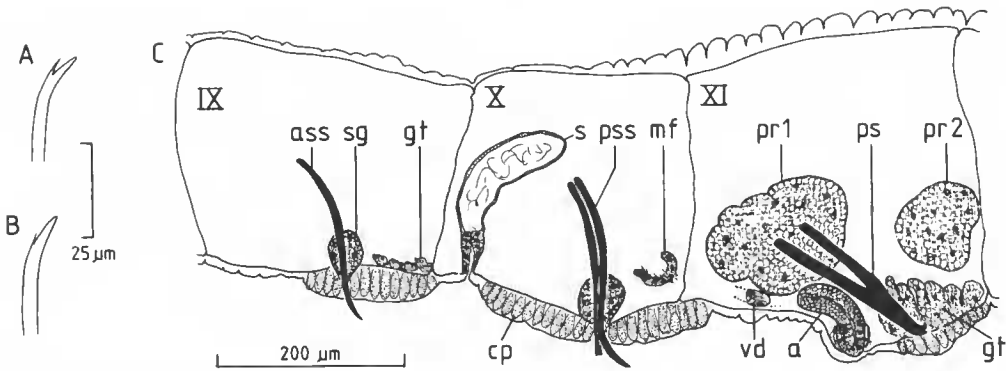


FIG. 1. — *Phalldrilus segonzaci* sp. nov. : A, anterior somatic seta ; B, posterior somatic seta ; C, lateral view of genitalia and genital setae in segments IX-XI.

REMARKS : The paratype has somatic setae which, although smaller, exhibit the same appearance and arrangement as those of the holotype, but genital organs and genital setae are not developed.

Phalldrilus segonzaci is very closely related to the North Atlantic deep-sea species *P. profundus* Cook, 1970 (cf. ERSEÜS, 1979b, 1983b). It is however separated from that species by its possession of ventral clitellar 'pads' in segments IX-XI (which appear to be absent in *profundus*), and by the appearance and orientation of the penial setae in segment XI (in *profundus*, penial setae slender, similar to spermathecal setae, and more or less erect ; in *segonzaci*, penial setae stout, different from spermathecal setae, with ental ends oriented towards anterior). Moreover, the new form (although no complete specimen available) is clearly larger and more robust than any of the specimens of *P. profundus* examined by the author, but whether this is a specific feature cannot be ascertained until additional material becomes available.

DISTRIBUTION AND HABITAT : Known only from the type locality in the South Indian Ocean. Abyssal sediment, 4,910 m depth.

Phalldrilus stilus sp. nov.

(Fig. 2)

HOLOTYPE : MNHN n° UB 553, whole-mounted specimen from E of South Africa, Indian Ocean, 30°22.3' S, 40°01.1' E, 4,910 m (24 Aug. 1979).

PARATYPE : MNHN n° UB 554-555, one specimen from type locality : anteriormost end whole-mounted, genital region longitudinally sectioned.

ETYMOLOGY : The epithet *stilus* is Latin for 'pointed stake', alluding to the penial seta at each male pore.

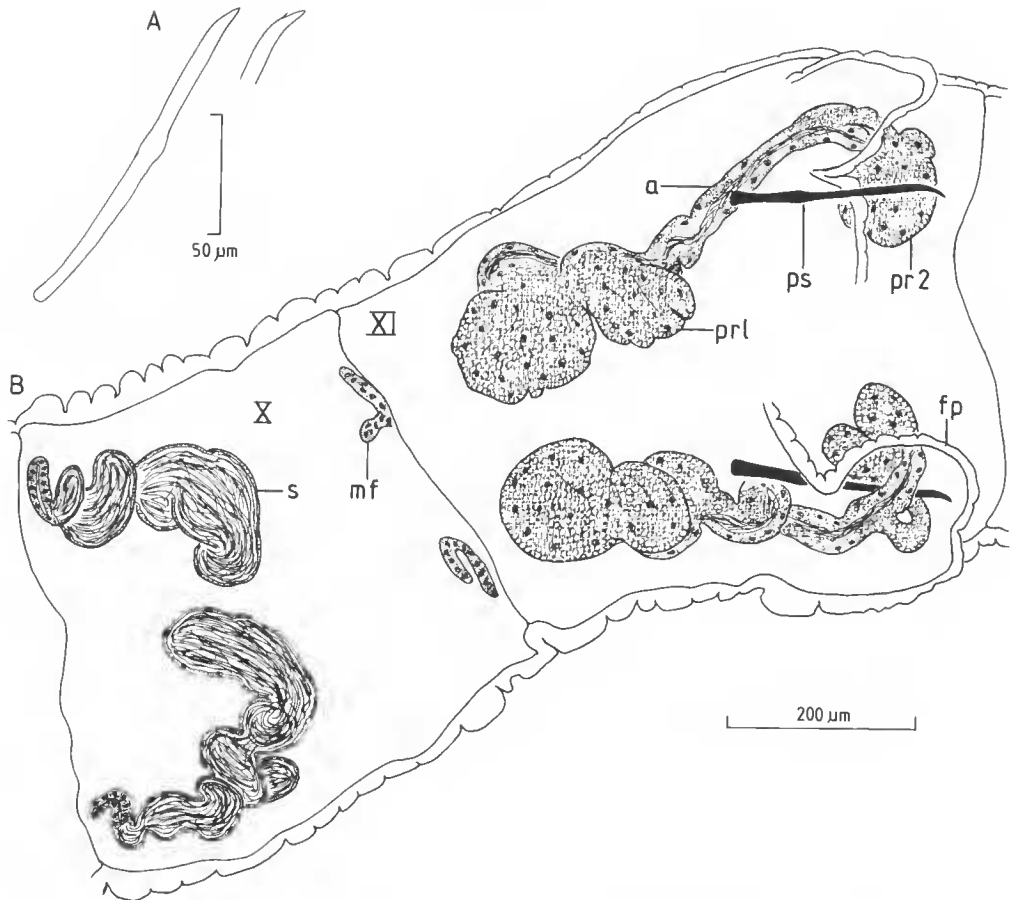


FIG. 2. — *Phallodrilus stilus* sp. nov. : A, somatic setae ; B, ventral view of genitalia and penial setae in segments X-XI.

DESCRIPTION

Length more than 7.4 mm, more than about 27 segments (specimens not complete). Width at XI (compressed holotype) 0.60 mm. Prostomium rounded, somewhat triangular in paratype. Clitellum extending over 1/2X-XII. Somatic setae stout and large, 135-175 μm long, 5-7 μm thick at node, sharply single-pointed or (seldom) with minute upper tooth (fig. 2A). Setae 3 per bundle anteriorly, 2-3 per bundle in postclitellar segments. Ventral setae of XI modified into penial setae (fig. 2B, ps), one at each side, 225-240 μm long, entally 9-12 μm thick, ectally much thinner, sharply single-pointed : setae basically straight but with ectal tips somewhat curved. Penial setae oriented in antero-posterior direction. Male pores paired on two flap-like protuberances, ventrally and posteriorly in XI. Spermathecal pores paired dorsally (exact position not established) and anteriorly in X.

Pharyngeal glands extending into VI (VII). Male genitalia (fig. 2B) paired. Vas deferens not seen in holotype, about 9-12 μm wide and coiled in paratype, entering long tubular atrium. Atrium 0.4-0.5 mm long (difficult to measure), ectally 23-52 μm wide, entally bearing large lumps of prostatic tissue apparently representing (very broadly attached) anterior prostate gland. Atrial lumen ciliated; except for areas bearing prostatic lumps, inner epithelium sparsely granulated. Outer lining of atrium very thin. Atrial duct ending in simple pore. Posterior prostate gland attached by discrete stalk to ectal end of atrial duct. Spermathecae (fig. 2B, s) very long and coiled, consisting of short ducts, 20-25 μm wide, and thin-walled ampullae, up to about 50 μm wide; latter filled with random sperm.

REMARKS : The very large setae, the flap-like male protuberances, the aberrant and elongate atria, and the long spermathecae make *P. stilus* a very distinct species, easily separated from its congeners. The prostatic lobes on the ental part of the atria are particularly noteworthy; in all other *Phallogrilus* species the anterior prostate gland is one discrete body, and its attachment with the atrium is confined to one restricted area near the entrance of the vas deferens. It appears possible, however, that *P. stilus* is rather closely related to the NW Atlantic *P. remus* Erséus, 1979, which also is an abyssal form with large genital setae, voluminous anterior prostate glands and slender spermathecae.

DISTRIBUTION AND HABITAT : Known only from the type locality in the South Indian Ocean. Abyssal sediment, 4,910 m depth.

DISCUSSION

More than thirty marine species of the family Tubificidae and one enchytraeid have now been described from depths of more than 1,000 metres (COOK, 1970a, b; ERSÉUS, 1979a, b, 1980a, 1982a, b, 1983a-c, 1984, 1985, present paper; COATES and ERSÉUS, 1985). All of the previously known species, except *Bathyrilus hadalis* Erséus, 1979a, from the Aleutian trench in the North Pacific, are Atlantic forms. Thus the two new species obtained during 'SAFARI I' are the first deep-sea species known from the Indian Ocean, and they substantially add to the (limited) number of species known from abyssal depths; most deep-sea oligochaetes described to date are from depths less than 3,000 metres (ERSÉUS, 1985).

Phallogrilus segonzaci and *P. stilus* are very large compared to other deep-sea oligochaetes. They both also have unusually large somatic setae, which otherwise tend to be a feature of some shallow-water, interstitial forms living in very coarse sediments (ERSÉUS, 1980b : 20; 1986 : 299).

It is interesting to note that *P. profundus* and *P. remus*, which appear to be the closest known relatives of *P. segonzaci* and *P. stilus*, respectively, also are abyssal. They both are North Atlantic forms, *P. profundus* being recorded from both sides of that ocean. It thus appears that parts of the deep-sea oligochaete fauna of the world have had an evolution of its own, separated from that of groups from inshore and continental shelf waters. At any rate, it has been documented that the Oligochaeta are well represented in the deep sea, and that they constitute a well established group in bathyal as well as abyssal habitats around the world.

Acknowledgements

I am very much indebted to Dr. Michel SEGONZAC for providing the oligochaete material, and to Ms. Barbro LÖFNERTZ and Ms. Aino FALCK-WAHLSTRÖM for technical assistance.

REFERENCES

- COATES, K. A., & C. ERSÉUS, 1985. — Marine enchytraeids (Oligochaeta) of the coastal Northwest Atlantic (Northern and mid U.S.A.). *Zool. Scr.*, **14** : 103-116.
- COOK, D. G., 1970a. — *Pelosclex dukei* n. sp. and *P. aculeatus* n. sp. (Oligochaeta, Tubificidae) from the North-west Atlantic, the latter being from abyssal depths. *Trans. Am. microsc. Soc.*, **88** (1969) : 492-497.
- 1970b. — Bathyal and abyssal Tubificidae (Annelida, Oligochaeta) from the Gay Head-Bermuda transect, with descriptions of new genera and species. *Deep Sea Res.*, **17** : 973-981.
- ERSÉUS, C., 1979a. — Taxonomic revision of the marine genera *Bathydrilus* Cook and *Macroseta* Erséus (Oligochaeta, Tubificidae), with descriptions of six new species and subspecies. *Zool. Scr.*, **8** : 139-151.
- 1979b. — Taxonomic revision of the marine genus *Phalodrilus* Pierantoni (Oligochaeta, Tubificidae), with descriptions of thirteen new species. *Zool. Scr.*, **8** : 187-208.
- 1980a. — New species of *Phalodrilus* (Oligochaeta, Tubificidae) from the Arctic deep sea and Norwegian fjords. *Sarsia*, **65** : 57-60.
- 1980b. — Specific and generic criteria in marine Oligochaeta, with special emphasis on Tubificidae. In : R. O. BRINKHURST, & D. G. COOK (eds.), Aquatic oligochaete biology. Plenum Publishing Corporation, New York : 9-24.
- 1982a. — *Atlantidrilus*, a new genus of deep-sea Tubificidae (Oligochaeta). *Sarsia*, **67** : 43-46.
- 1982b. — Taxonomic revision of the marine genus *Limnodriloides* (Oligochaeta : Tubificidae). *Verh. naturw. Ver. Hamb. (NF)*, **25** : 207-277.
- 1983a. — New records of *Adelodrilus* (Oligochaeta, Tubificidae), with descriptions of two new species from the North-west Atlantic. *Hydrobiologia*, **106** : 73-83.
- 1983b. — Deep-sea *Phalodrilus* and *Bathydrilus* (Oligochaeta, Tubificidae) from the Atlantic Ocean, with descriptions of ten new species. *Cah. Biol. mar.*, **24** : 125-146.
- 1983c. — A new bathyal species of *Coralliodrilus* (Oligochaeta : Tubificidae) from the Southeast Atlantic. *Proc. biol. Soc. Wash.*, **96** : 273-275.
- 1984. — New and little-known species of deep-sea Tubificidae (Oligochaeta) from the north-west Atlantic. *Zool. Scr.*, **13** : 101-106.
- 1985. — Distribution and biogeography of Oligochaeta. In : L. LAUBIER & C. MONNIOT (eds.), Peuplements profonds du golfe de Gascogne. Campagnes BIOGAS. Institut Français de Recherche pour l'Exploitation de la Mer, Brest : 365-367.
- 1986. — Marine Tubificidae (Oligochaeta) at Hutchinson Island, Florida. *Proc. biol. Soc. Wash.*, **99** : 286-315.